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Invention Title: **HANDS-FREE ACCESSORY FOR MOBILE TELEPHONES**

Details of Associated Provisional Application:

PO7675 filed 3 July 1998

The following statement is a full description of this invention, including the best method of performing it known to us

H102502 03 JUL98

HANDS-FREE ACCESSORY FOR MOBILE TELEPHONES

Field of the Invention

This invention relates to hands-free devices for mobile/cellular telephones.

5 Background of the Invention

Hands-free devices for mobile telephones are in widespread use. They are popular because they enable a person to communicate using a mobile telephone while driving a motor vehicle or during other activities. Such devices also avoid potential problems associated with signal radiation. However, such devices are
10 relatively expensive and it would be desirable to provide a hands-free device which is less expensive and which nevertheless allows hands-free communication using a mobile telephone.

Australian Patent AU-B-27183/95 discloses a hands-free mobile telephone device in which acoustic couplers are held to the microphone and speaker of the
15 mobile telephone by elastic bands. This arrangement requires bands to be separately attached to the mobile telephone with the possible result that the acoustic coupler will not be accurately aligned with the speaker or the microphone thereby resulting in poor performance. In addition, it is inconvenient to have to wear a headset, and this may interfere with the driver's ability to properly control the
20 vehicle.

Summary of the Invention

It is an object of the present invention to provide a simple hands-free device for a mobile telephone which at least ameliorates the above problem associated with the known device.

25 The invention provides a hands-free device for a mobile/cellular telephone having a speaker sound outlet(s), including a fitting adapted to be sealingly held in position over the speaker sound outlet(s) of the telephone by self-adhesive means which forms a substantial acoustic seal with the body of the phone around the speaker or with a phone pouch or casing, said fitting having an opening which
30 removably carries, directly or indirectly, a sound tube including an earpiece at its



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free end, said sound tube being mounted on the fitting and capable of swivelling with respect to the fitting, said fitting acoustically coupling the speaker sound outlet(s) to the sound tube to ensure adequate sound transmission to the earpiece, said opening in said fitting enabling normal use of the telephone when the sound tube is removed therefrom in said fitting enabling normal use of the telephone when the sound tube is removed therefrom.

In another aspect the invention provides a hands-free conversion kit for a mobile telephone casing or pouch, comprising a fitting adapted to be secured to the casing or pouch in an acoustically sealed manner in alignment with the speaker sound outlet(s) of a telephone secured in the casing or pouch, said fitting having an opening which removably carries, directly or indirectly, a sound tube including an earpiece at its free end, said sound tube being free to swivel with respect to said fitting and acoustically coupling the speaker sound outlet(s) to the sound tube to ensure adequate sound transmission to the earpiece, said opening in said fitting enabling normal use of the telephone when the sound tube is removed therefrom.

If desired, a similar fitting can be included in the casing or pouch or directly attached to the telephone in alignment with the microphone of the telephone, although it appears that adequate communication can be achieved by the use of the microphone without an attached sound tube.

The casing or pouch may be in any suitable form, including leather, a suitable plastics material, vinyl, and may be in the form of a unitary moulding providing all of the functional features described above and below.

The invention also provides for the conversion of an existing casing or pouch for a mobile telephone to include the fitting and sound tube defined above.

Where the fitting is attached directly to the telephone, this is achieved by means of a suitable adhesive means supported by the fitting and positioned to contact the surface of the telephone to secure the gasket to the telephone surrounding the speaker sound outlet(s) and/or the microphone.

The fitting preferably includes a rigid member having an opening which received a fixing neck on the gasket, the fixing neck having a central opening which



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- in turn receives a sound tube receiving member having a smoothly curved sound transmitting passage to which the sound tube is connected. The sound tube may be removable from the opening in the fitting to enable the mobile telephone to be used in the normal manner with the user listening through the opening in the fitting. The
- 5 sound tube receiving member preferably engages the rigid member to alter the position of the sound tube receiving member with respect to the phone.

- The rigid member preferably comprises a moulded plate of plastics or any other suitable material having an opening. The fixing neck of the gasket penetrate an opening in the casing or pouch and the plate is suitably attached to the casing or
- 10 pouch, for example by resilient engagement between the sealing gasket referred to above and the moulded plate. The plate and the gasket may be integrally moulded



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or the casing or pouch and the plate and gasket may be made in one piece. Several alternative arrangements are further described in the following description.

Brief Description of the Drawings

Figure 1 is a plan view of a casing or pouch for a mobile telephone embodying the invention, and showing an alternative sound tube connection arrangement;

Figure 2 is a side elevation of the casing or pouch of Figure 1 showing the same sound tube arrangements;

Figure 3 is a side elevation and fragmentary plan views of an alternative sound tube connection arrangement;

Figure 4 includes side elevations showing four alternative methods of storage of the sound tube and earpiece;

Figure 5 is a general assembly drawing showing the relationship between the various parts of the device;

Figures 6A to 6D are sectional elevations of four alternative sound tube connection arrangements;

Figure 7 is a detailed view showing the manner in which the fitting of Figure 6D cooperates with the mobile telephone;

Figure 7A is a sectional elevation of a suitable earpiece;

Figure 7B shows an alternative embodiment in which the fitting is adapted for attachment for directly to the telephone;

Figure 8 schematically illustrates several different modes of use of the hands-free device;

Figure 9 illustrates two options for storing the mobile telephone in a motor vehicle for use with the hands-free device;

Figure 10 illustrates several sash belt hanger arrangements for holding the casing or pouch and mobile telephone in a vehicle;

Figure 11 illustrates different arrangements for the door sill hanger embodiment; and

Figure 12 illustrates the casing or pouch having an attached carry strap or necklace enabling the mobile telephone to be used in various manners as illustrated.

Description of Preferred Embodiments

Referring firstly to Figures 1, 2, 5 and 6, the hands-free device embodying the invention includes a casing or pouch 1, which may be a known leather/vinyl casing or pouch, or some other form of casing or pouch made from any other suitable material, to which a fitting 2 is attached, the fitting receiving a sound tube 3 having an earpiece 4 of known construction fitted at its free end. If desired, the mobile phone casing or battery casing or pouch 1 may have a spring loaded clip 5 of known construction to enable the phone casing or pouch to be secured in a pocket or in some other suitable position.

The fitting 2 includes a moulded plastics (e.g. acrylic) plate 6 to which a rubber or plastics sealing gasket 7 is attached in the manner shown in Figure 6 of the drawings, the gasket acting as a seal between the speakers of the mobile telephone M and the fitting 2. The gasket 7 may form part of an inner plate 8, as shown in more detail in Figures 5, 6 and 7. The moulded plastics plate 6 may be in the form of a badge or a badge holder to enable the plate to perform an advertising or identification function.

In the presently preferred form of the invention shown in Figure 6D and Figure 7, the plate 6 has a stepped central opening 6A which receives an annular outwardly flanged portion 7A of the gasket 7, which is configured to be flexible to assume the shape of the mobile phone casing M surrounding the speaker S and is compressible to maintain the seal between the telephone M and the fitting 2, as shown in Figure 7. The central opening in the gasket portion 7A receives the spigot 3B of an elbow fitting 3A to which the sound tube 3 is attached as shown. The elbow 3A is thereby able to swivel in the fitting 2 so that the sound tube 3 can be positioned in any convenient orientation with respect to the telephone M.

As shown in the various Figures, the sound tube 3 may be connected to the fitting 2 in numerous other ways, including coaxially with the outer plate 6, radially into the outer plate 6, as shown in Figures 1B and 2B or the sound tube may connect

with the fitting 2 at the gasket/inner plate assembly 7, 8, as shown in greater detail in Figures 3 and 6 of the drawings.

To ensure that the sound tube 3 is not flattened or permanently kinked when stored or used, the tube 3 is preferably made from silicon tubing of a suitable colour, such as black.

The casing or pouch 1 includes means for storing the sound tube 3 in a convenient manner while the hands-free device is not in use. Suitable storage arrangements are shown in Figures 1 and 2, in which the sound tube is positioned behind spaced storage loops 10 and 11 which are secured to the casing or pouch 1 by sewing, adhesive, or are integrally moulded with the casing or pouch where the casing or pouch is of moulded construction.

One suitable earpiece 4 is illustrated in greater detail in Figure 7A, and it will be noted that the earpiece 4 includes a smoothly curved elbow 4A having an internal smoothly curved sound passage 4B opening into a larger conical sound outlet 4C which ensures proper sound transmission from the sound tube 3 to the earpiece 4 engaged by the earpiece. To ensure that the earpiece is comfortably received and held in the ear, a foam plastic annulus 4D of non-slippery slightly gripping texture is mounted at the end of the earpiece 4, the annulus 4D being slightly compressible to ensure that the earpiece properly engages differently shaped ear openings. The annulus 4D is either glued to the earpiece 4 or engages the earpiece as a friction fit.

Figure 4 shows three other alternative systems for storing the sound tube 3, including a flap 12 secured to the casing or pouch 1 and openable and closeable by means of a slide fastener 13, press-studs 14 or velcro or similar strips 15. Alternatively, the casing or pouch may support spools or bobbins around which the sound tube 3 can be wound for storage and securement.

Referring to Figure 7B, an alternative embodiment of the invention in which the fitting 2 is directly secured to the surface of the telephone M is illustrated. As will be seen in this Figure, the gasket 7 is replaced by an annular element 7A or 7B of double-sided adhesive by means of which the fitting 2 is directly adhesively

secured to the telephone with the annular element surrounding the speaker S as illustrated and providing the required acoustic seal.

The annular element is preferably resilient and may be made from known double-sided adhesive tape material.

5 Several modes of using the hands-free device are schematically illustrated in Figure 8 of the drawings and such modes of use will be well understood by person skilled in the art from the Figures and from the accompanying explanation.

10 In Figure 8A the mobile phone is suspended from the hanger attached to the seat headrest, in Figure 8B the mobile phone hangs by a clip on the rear of the pouch to the driver's lapel pocket, shirt button etc., in Figure 8C the mobile phone rests on the driver's lap, in Figure 8D the mobile phone is held in the driver's hand, in Figure 8E the mobile phone is attached to the car by a clamp or hanger, in Figure 8F the mobile phone is suspended from the seat belt by a pouch clip and hanger.

15 In Figures 9, 10, 11 and 12, alternative modes of storing and using the mobile telephone above or in its casing or pouch are also illustrated, and once again, these modes of use will be understood by persons skilled in the art from the Figures and the accompanying explanation.

20 In Figure 9A, a door sill hanger is illustrated in which a narrow tongue at the top end of the hanger is inserted down between the window glass and the window gutter. A clip on the rear of the pouch or phone or phone battery is inserted into slots in the hanger. This arrangement is further detailed in Figure 11.

25 In Figure 9B, a safety belt hanger is clipped over the sash belt and is semi free to be moved up or down the sash by hand as shown in Figure 10. A clip on the rear of the phone, phone battery or pouch is inserted into a slot in the hanger, either in the position shown in the top figure or with the antenna pointing downwards as in the lower figure.

As illustrated, the casing or phone may be used in the sash belt hanger mode or the car door sill hanger mode in an inverted position as illustrated in Figures 10 and 11.

It will be appreciated from the above description that the preferred forms of the invention provide a particularly simple and convenient hands-free device for use with a mobile telephone. Such a hands-free device can be manufactured at significantly lower cost than the electronic hands-free devices currently available without any significant loss of communication via the mobile telephone. The inclusion of the gasket 7 in the fitting 2 ensures that the sound tube 3 is adequately acoustically coupled to the speaker S of the telephone M as illustrated above.

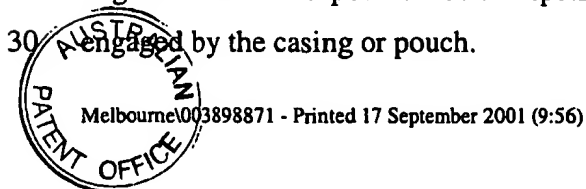
When the hands-free device according to the embodiments is compared with the device described in Australian Patent AU-B-27183/95, the following advantages are apparent :

Patent No. AU-B-27183/95	Invention
13 components	6 components
Bulky, untidy, components projecting easy to catch and be displaced making phone inoperable.	Simple, tidy, minimum projection, difficult to make inoperable accidentally.
Moving parts subject to wear and less effective operation. - microphone boom not securely held can fall out or be knocked out	No moving parts required for adjustment when using.
Component which goes behind ear is itself not adjustable and will not fit all users. - difficult to obtain a snug fit. - causes difficulty in keeping earpiece in ear. - likely to fall out. - may be unsafe when using in car.	Earpiece alone provides snug fit for all users. User friendly (silicon) sound tube does not fight against user and allows earpiece to sit in ear without tendency to be pulled out.
Long tubes. - awkward for storage. - likely to tangle. - likely to kink. - sound transmission efficiency reduced.	Short tube. - easy storage. - doesn't tangle. - doesn't kink. - better transmission.

5	<p>Resilient (elastic) bands.</p> <ul style="list-style-type: none"> - can stretch, perish and become ineffective. - can break, would need spares to operate phone. - tension on either side of coupler is uneven causing coupler to not sit square thereby breaking acoustic seal. 	<p>Bands not required.</p> <ul style="list-style-type: none"> - non resilient accurately manufactured and fitted case provides constant adequate and even tension to sound gasket against phone. Acoustic seal kept.
10	<ul style="list-style-type: none"> - easily dislodged from position and pull couplers out of position. - pulling loudspeaker coupler or tube pulls microphone coupler away from microphone and vice versa. 	<ul style="list-style-type: none"> - no dislodgment of gasket from phone. - does not occur.
15	<ul style="list-style-type: none"> - tension to locate couplers varies dependent on dimensions and properties of resilient bands and relative dimensions of various phone types. 	<ul style="list-style-type: none"> - constant tension, and therefore acoustic seal, is maintained because cases are made to fit specific phones. Impossible for gasket to fall off. No adjustment of tension is required.
20	<p>Couplers can fall off or be dislodged. Acoustic seal is affected. No way of adjusting if loose connection.</p>	
25	<p>Transmission tube to microphone runs across window of phone and keypad.</p> <ul style="list-style-type: none"> - interferes with vision of window and keypad and operation of phone keys. - pulling/moving tube pulls coupler/s out of position. 	<p>Phone vision and operation is unhindered by any tubes.</p>
30	<p>Sound transmission indirect and inefficient.</p> <p>Microphone cup to boom, boom to fitting, 180 deg change in direction, via long tube and bends and kinks in tube, then 90 deg change in direction through coupler.</p>	<p>Sound transmission is direct.</p> <p>Phone loudspeaker via gasket and 90 deg bend in elbow, short non kinking tube and 90 deg bend in earpiece.</p>
35		
40	<p>Requires setting and adjustment for placement in either ear.</p>	<p>Fits either ear instantly without settings or adjustments.</p>
	<p>Rigid earpiece.</p> <ul style="list-style-type: none"> - not comfortable or proper fitting in all ears. - sound transmission inefficient. 	<p>Flexible earpiece.</p> <ul style="list-style-type: none"> - fits all ears comfortably. - friction of material enables closer fit and better sound transmission.
	<p>No means of attachment to person.</p>	<p>Users clip on rear of case.</p>

The claims defining the invention are as follows:

1. A hands-free device for a mobile/cellular telephone having a speaker sound outlet(s), including a fitting adapted to be sealingly held in position over the speaker sound outlet(s) of the telephone by self-adhesive means which forms a substantial acoustic seal with the body of the phone around the speaker or with a phone pouch or casing, said fitting having an opening which removably carries, directly or indirectly, a sound tube including an earpiece at its free end, said sound tube being mounted on the fitting and capable of swivelling with respect to the fitting, said fitting acoustically coupling the speaker sound outlet(s) to the sound tube to ensure adequate sound transmission to the earpiece, said opening in said fitting enabling normal use of the telephone when the sound tube is removed therefrom.
2. The hands-free device of claim 1, wherein said fitting includes a plate having said opening, sound tube supporting means engaging said opening and having means for removably retaining said supporting means in said opening.
3. The hands-free device of claim 2, wherein said self-adhesive means includes self-adhesive gasket means for engaging said telephone to acoustically couple the speaker sound outlet(s).
4. The hands-free device of claim 2 or 3, wherein said plate is substantially rigid and said gasket is configured to include a flanged neck portion which engages a step in said opening to secure the gasket to the plate, said gasket neck defining said opening, said sound tube supporting means being configured as an elbow fitting from which said shaped spigot projects, said shaped spigot mechanically engaging said flanged neck portion to removably retain said elbow fitting in said gasket so that the elbow fitting is freely rotatable within said opening while maintaining an adequate acoustic coupling.
5. The hands-free device of any one of claims 2 to 4, wherein said fitting is attached to a casing or pouch enclosing the telephone with said fitting in alignment with the position of the speaker sound outlet(s) of the telephone when engaged by the casing or pouch.



6. The hands-free device of claim 5, wherein the fitting engages an opening in the casing or pouch and the portion of the casing or pouch surrounding the opening is clamped between the plate and the gasket.

7. The mobile telephone of any preceding claim further comprising
5 means for attaching the mobile telephone and/or the case to the clothing of the user, a seat-belt or the window of the user's vehicle to enable convenient use of the hands-free device.

8. The hands-free device of any preceding claim, wherein the earpiece is substantially as described with reference to Figure 7A of the accompanying
10 drawings.

9. The hands-free device of any preceding claim, wherein the fitting is substantially as described with reference to any one of Figures 6A to 6D and 7 of the accompanying drawings.

10. The hands-free device of any one of claims 1 to 4, wherein the fitting
15 is directly attached to the surface of the mobile telephone by an annular element of adhesive material which adhesively secures the fitting directly to the mobile telephone surrounding the speaker sound outlet(s).

11. The hands-free device of claim 10, wherein the annular element is resilient.

12. The hands-free device of any one of claims 1 to 9, wherein the fitting
20 is attached to a casing or pouch for holding the telephone, said casing or pouch including means for storing the sound tube and earpiece when not in use.

13. The mobile telephone of any preceding claim further comprising means for attaching the mobile telephone and/or the casing or pouch to the clothing
25 of the user, a seatbelt or the window or other part of the user's vehicle to enable convenient use of the hands-free device.

14. A hands-free conversion kit for a mobile telephone casing or pouch, comprising a fitting adapted to be secured to the casing or pouch in an acoustically sealed manner in alignment with the speaker sound outlet(s) of a telephone secured
30 in the casing or pouch, said fitting having an opening which removably carries,



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directly or indirectly, a sound tube including an earpiece at its free end, said sound tube being free to swivel with respect to said fitting and acoustically coupling the speaker sound outlet(s) to the sound tube to ensure adequate sound transmission to the earpiece, said opening in said fitting enabling normal use of the telephone when
5 the sound tube is removed therefrom.

15. The hands-free device of claim 7 substantially as hereinbefore described with reference to any one of Figures 8, 9, 10, 11 or 12 of the accompanying drawings.

10 16. A hands-free device for a mobile telephone substantially as hereinbefore described with reference to the Figures 1 to 3, 5 or any one of Figures 6A to D or 7 and 7A of the accompanying drawings.

17. A hands-free device for a mobile telephone substantially as hereinbefore described with reference to Figure 7B of the accompanying drawings.

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Dated: 11 September 2001

FREEHILLS CARTER SMITH BEADLE

Patent Attorneys for the Applicant:

GEOFFREY ALLAN THOMAS

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ABSTRACT

A hands-free device for a mobile telephone including a fitting 2 adapted for connection to a mobile telephone M in alignment with the speaker S of the mobile telephone, the fitting 2 including a gasket 7 which acoustically couples the speaker S to a sound tube 3 having an earpiece 4, the fitting 2 being mounted on a casing 1 for the mobile telephone M or adhesively secured to the mobile telephone M so that the gasket 7 surrounds the speaker S.

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Fig.1

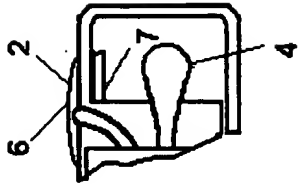


Fig.2

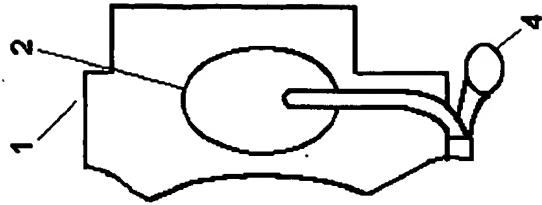


Fig. B

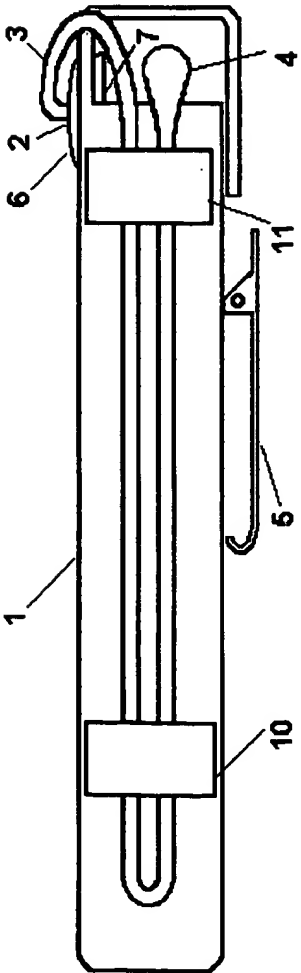
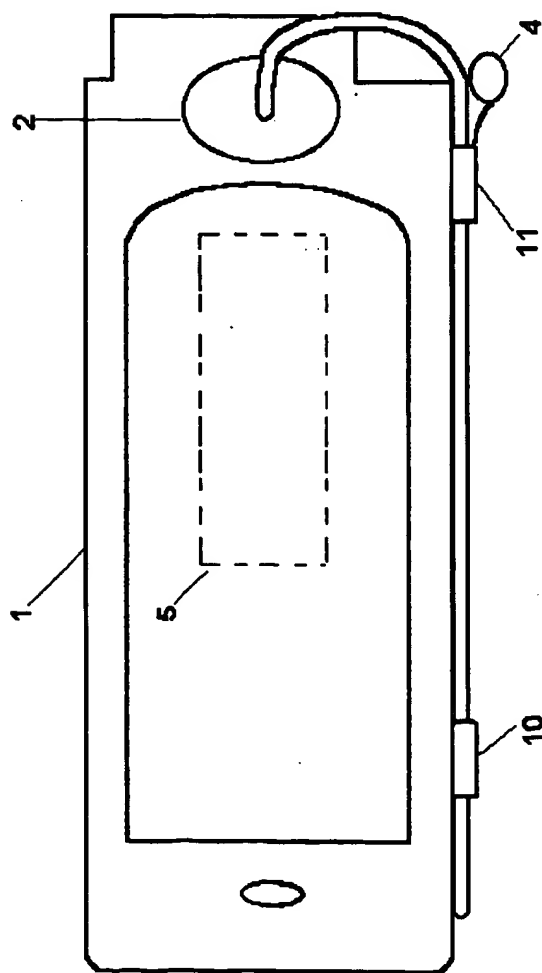


Fig. A



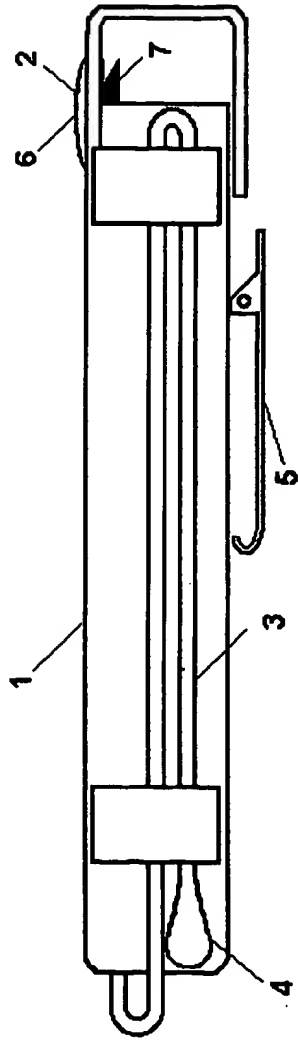


Fig. D

Fig. 3

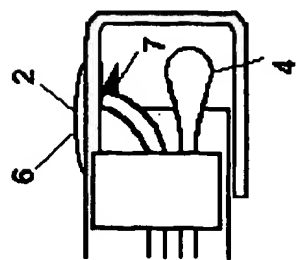
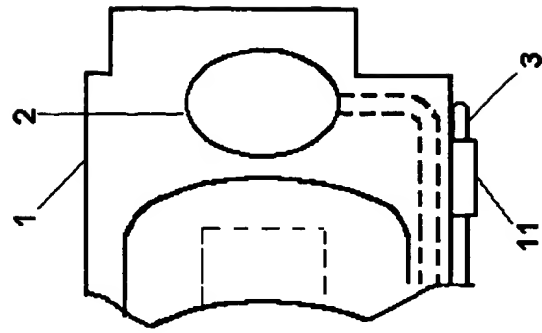


Fig. C

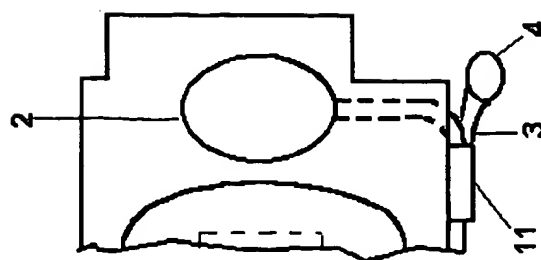
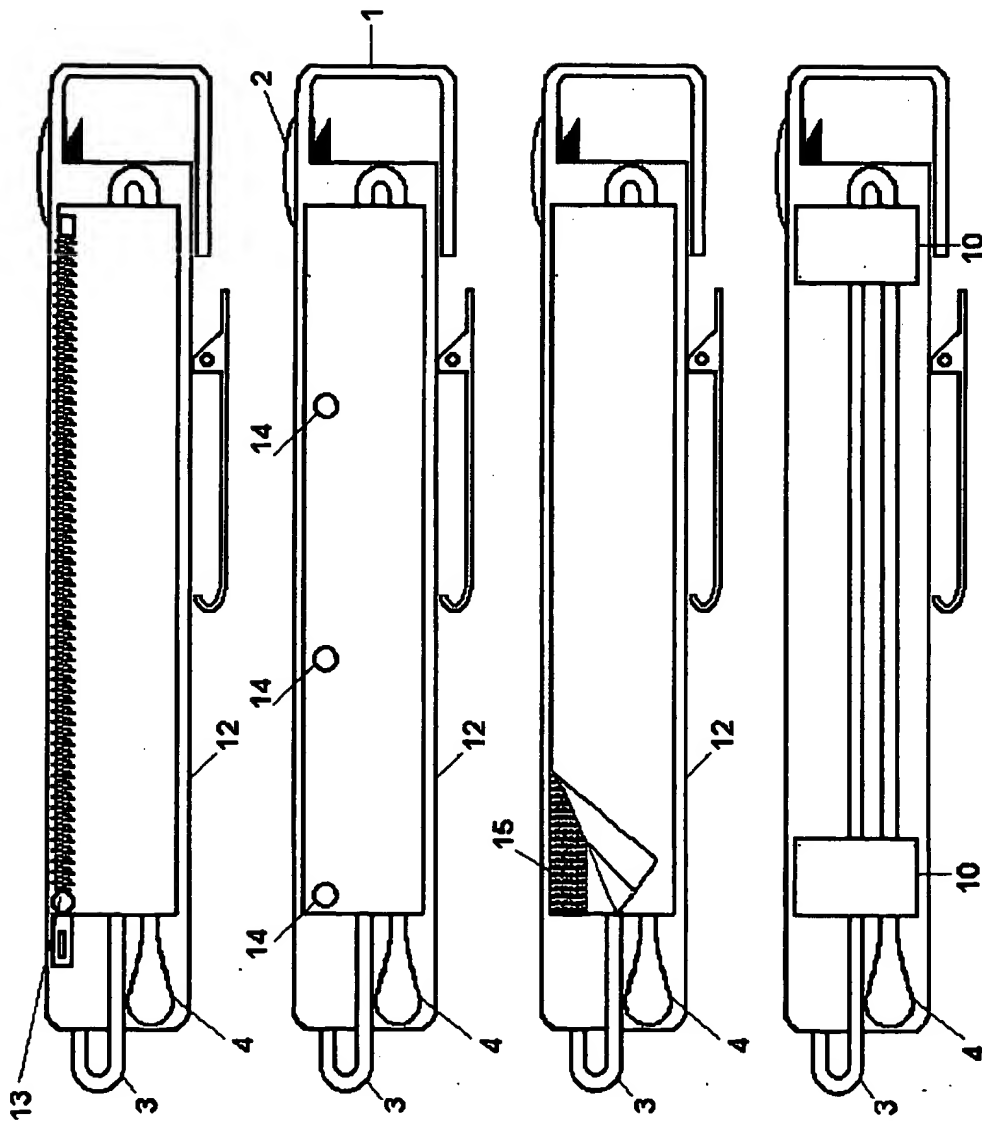


Fig.4



3 10 8 2 4 5

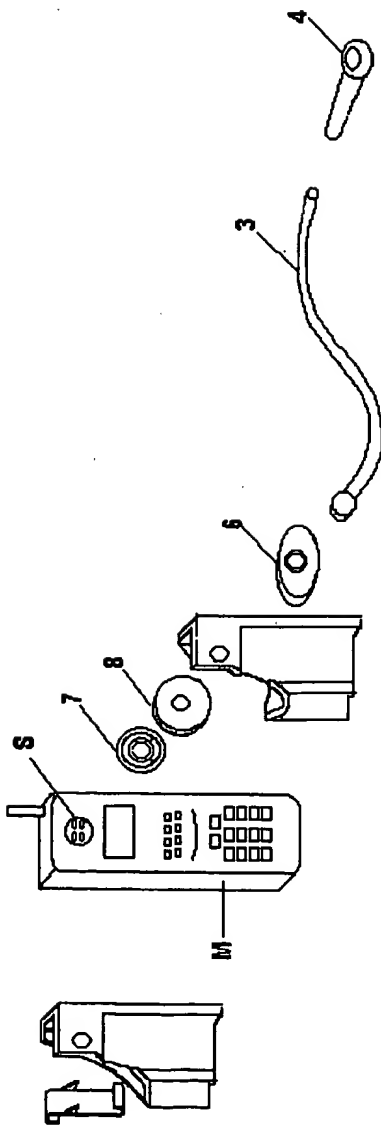


Fig. 5

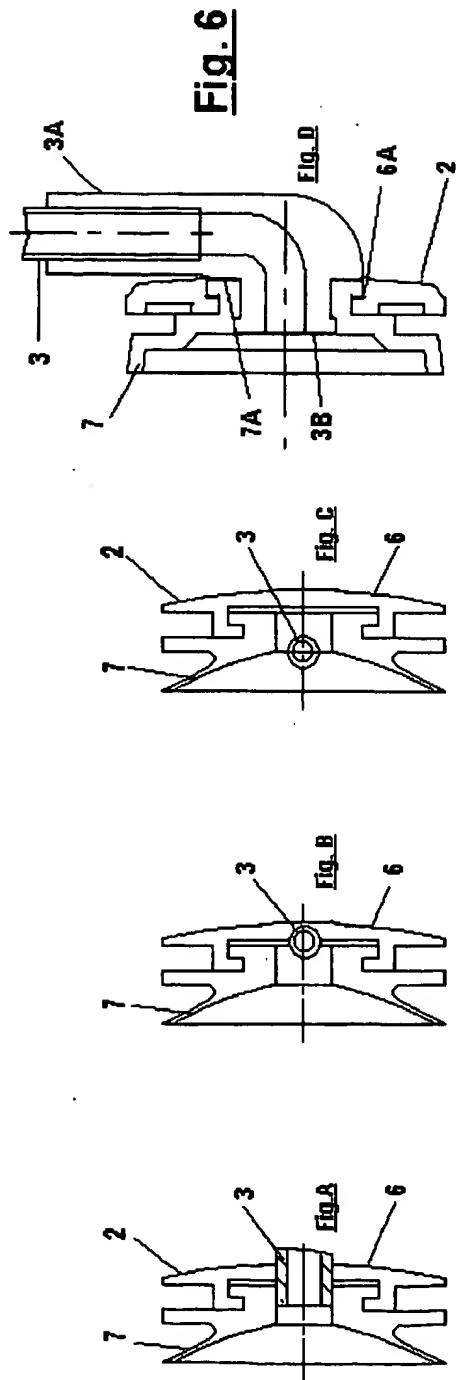
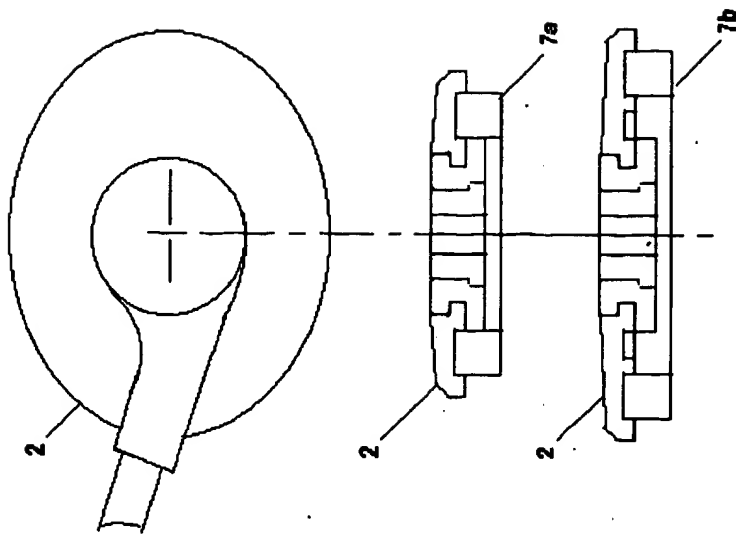
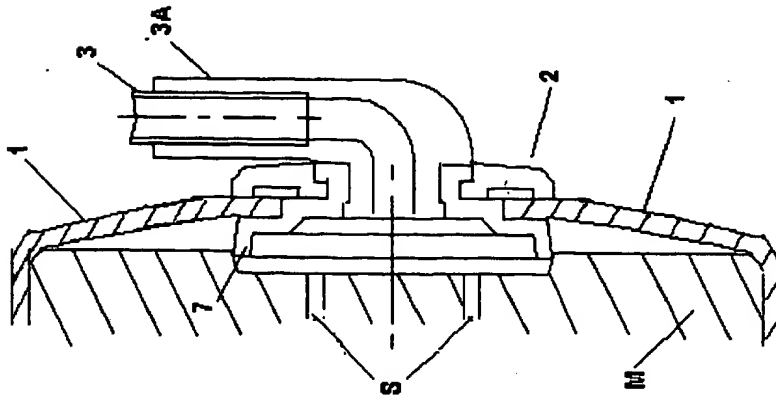
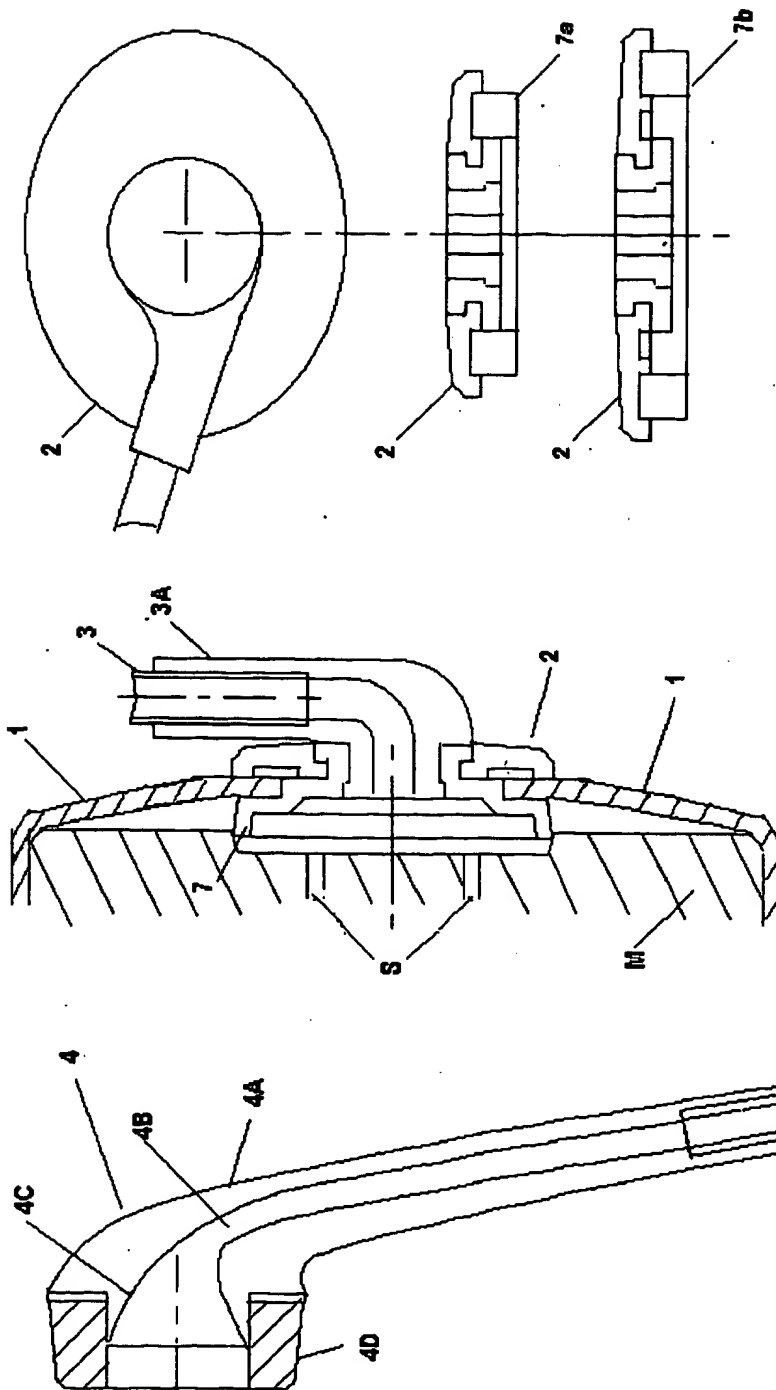


Fig. 6



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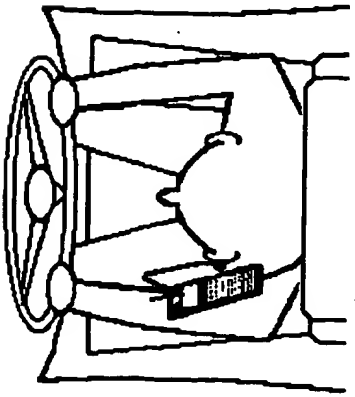
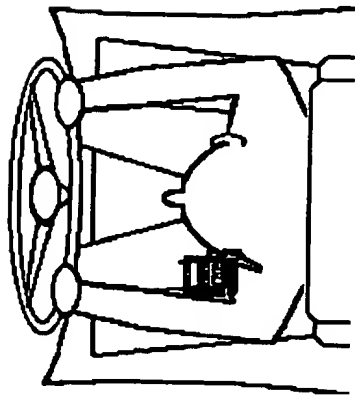
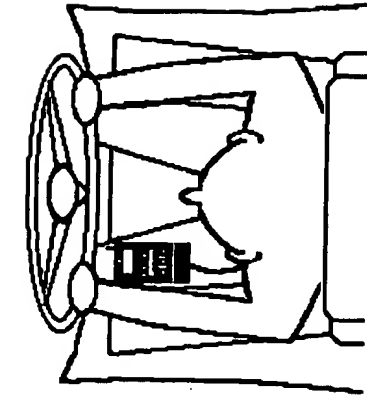


Fig. 8

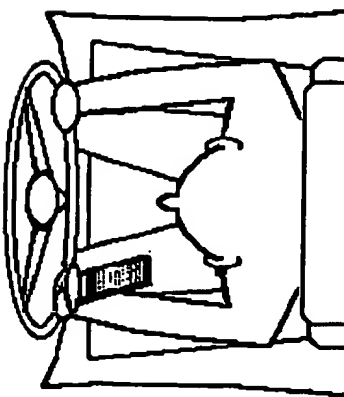
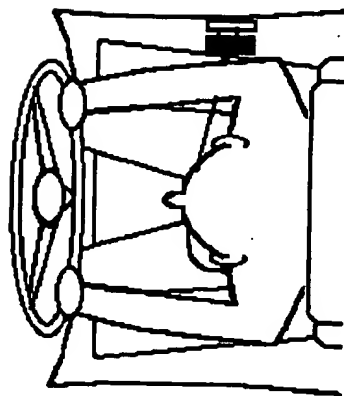
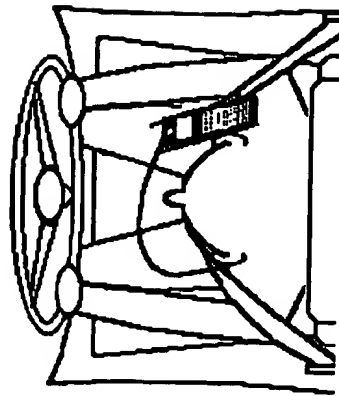


Fig. 9

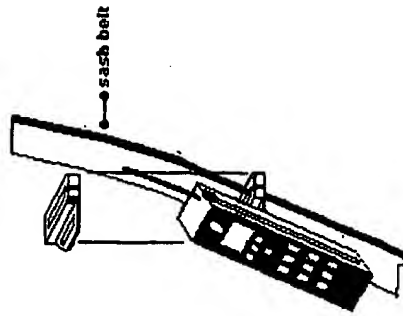


Fig. 9B

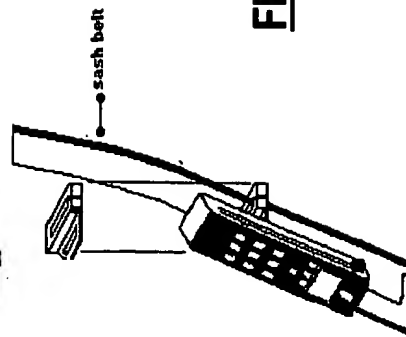
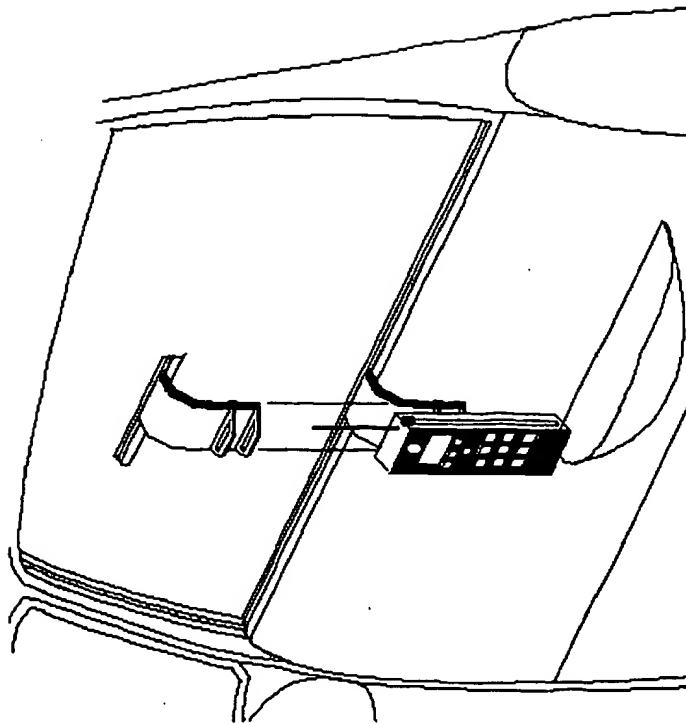
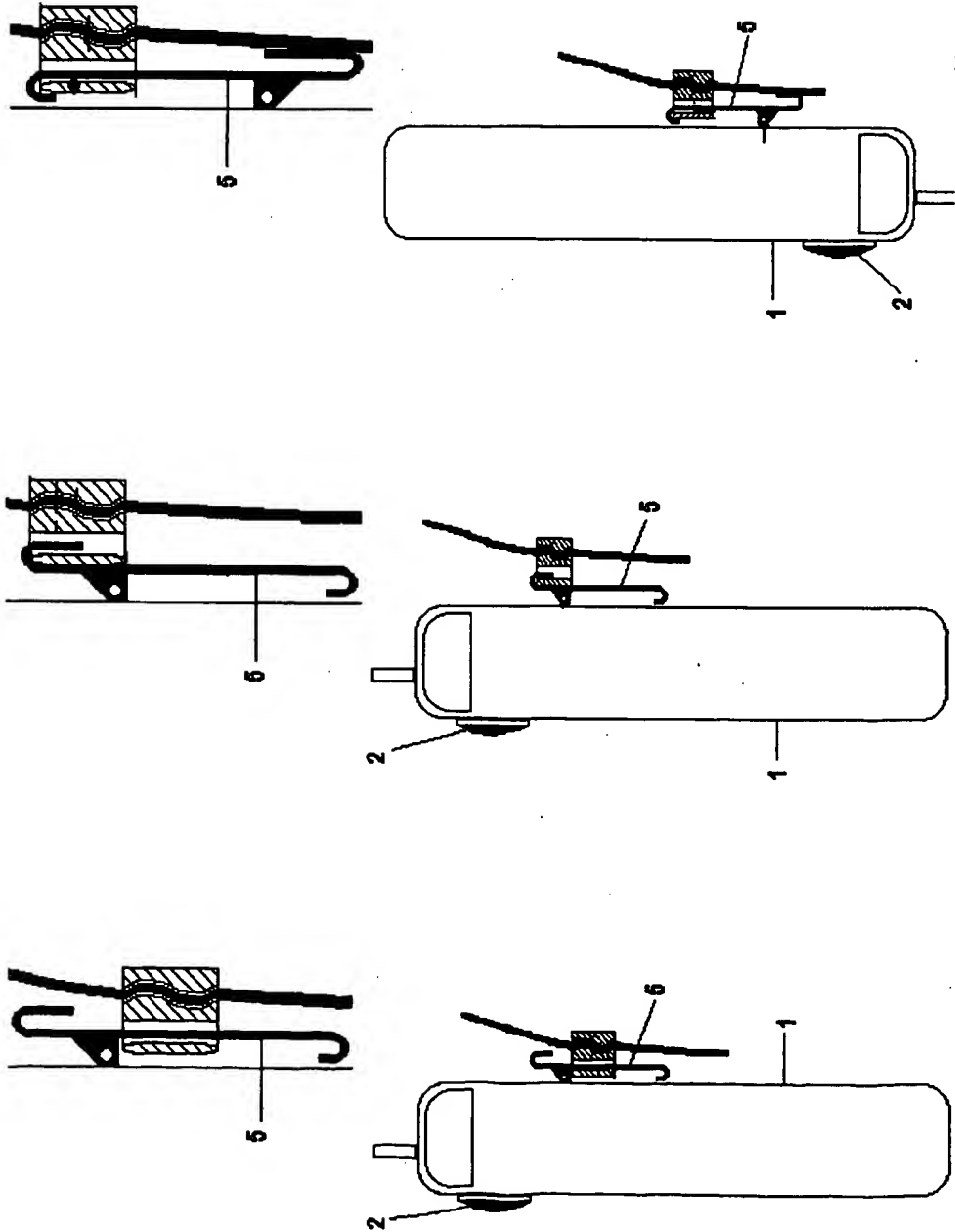


Fig. 9A



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Fig. 10



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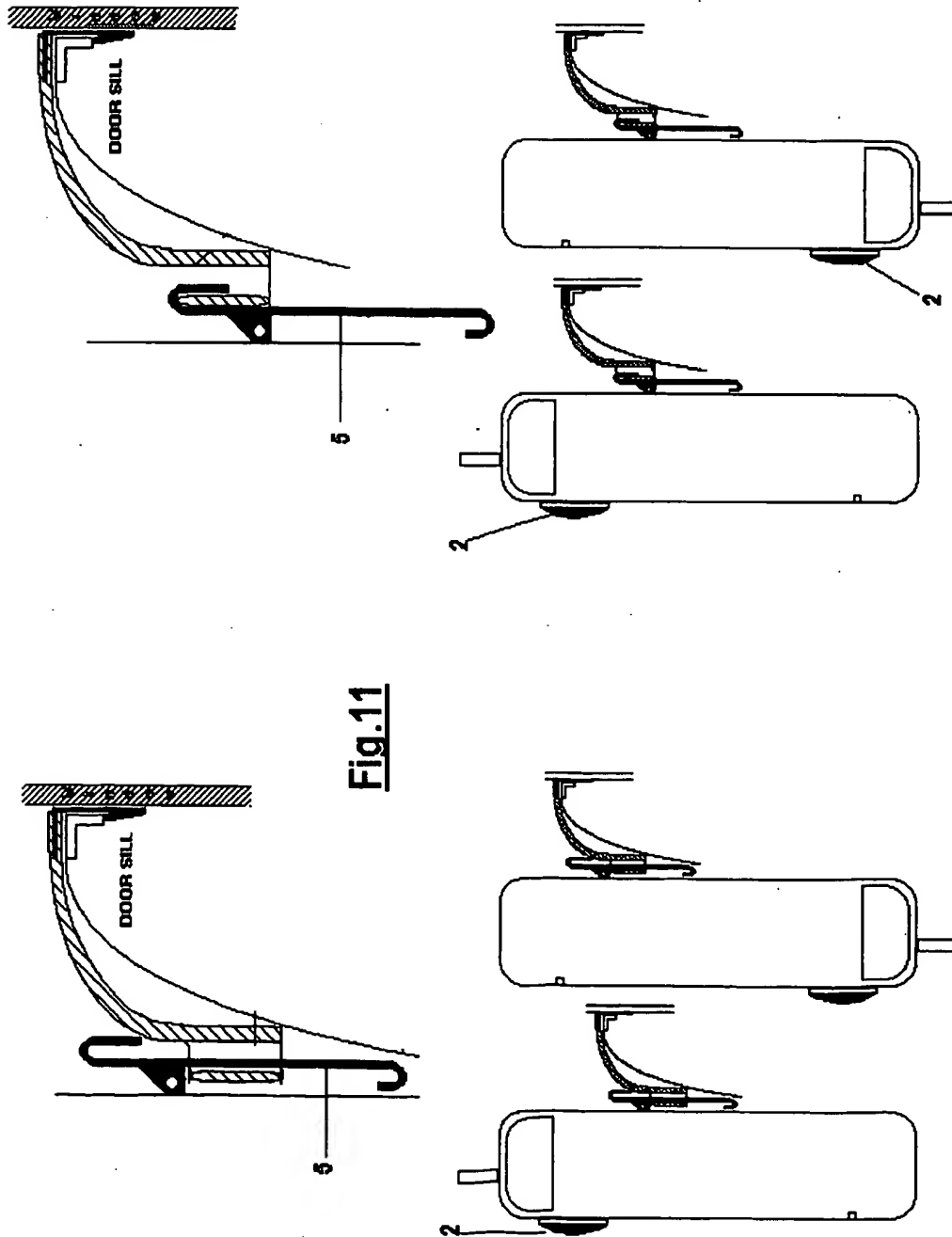
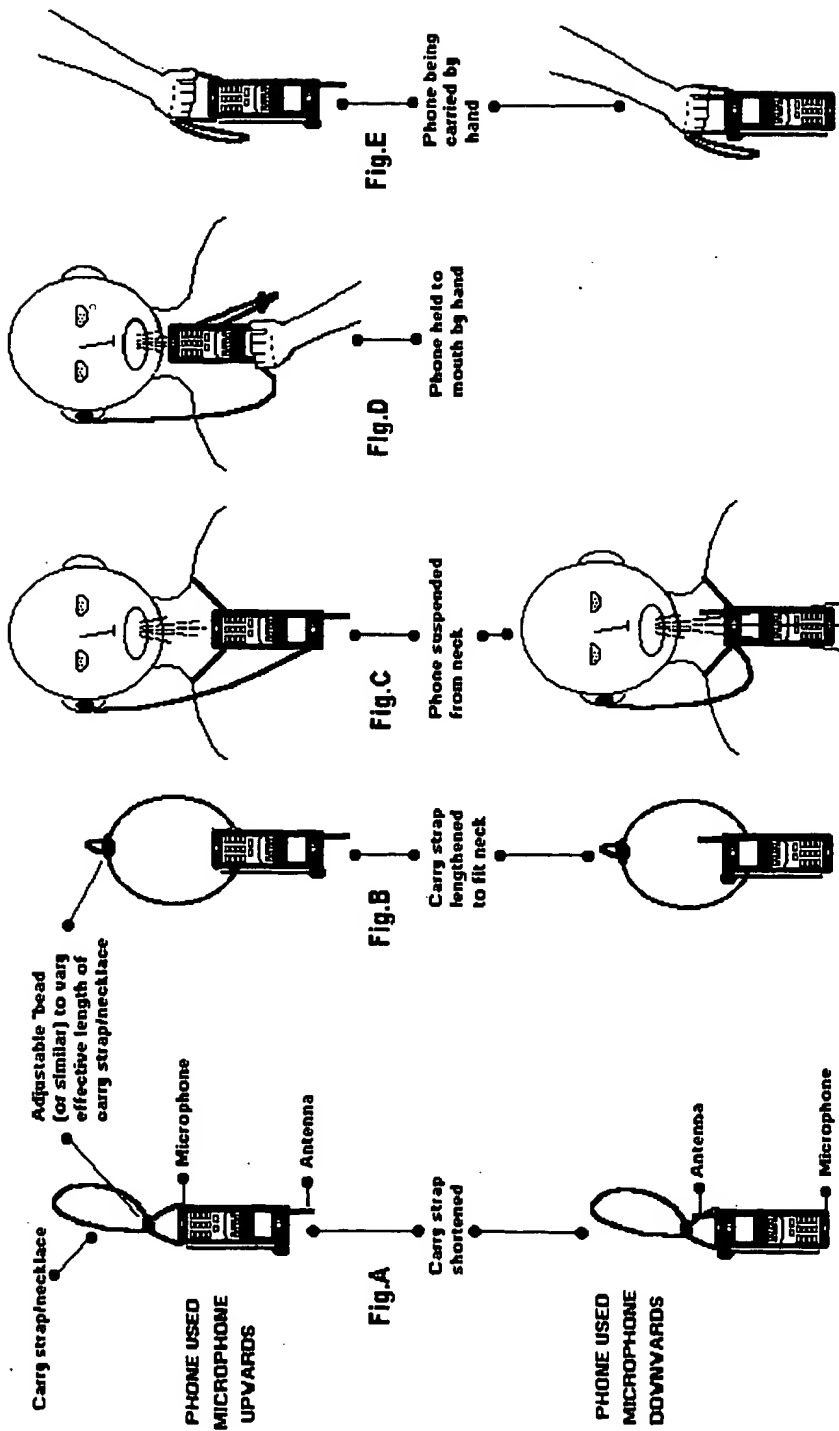


Fig.11

Fig.12

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